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10/743,146

12/23/2003

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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

04/25/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

|                              |                                      |  |  |
|------------------------------|--------------------------------------|--|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/743,146 | <b>Applicant(s)</b><br>MATSUOKA ET AL. |  |
|                              | <b>Examiner</b><br>TRACY DOVE        | <b>Art Unit</b><br>1795                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-20 is/are pending in the application.
- 4a) Of the above claim(s) 3 and 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 2/5/08. Applicant's arguments have been considered, but are not persuasive. Claims 1 and 3-20 are pending. Claims 3 and 4 are withdrawn. This Action is FINAL, as necessitated by amendment.

#### ***Election/Restrictions***

Applicant requested nonelected Group II be rejoined with Group I. Group II will be considered for rejoinder only if all claims in elected Group I are directed toward allowable subject matter.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 5-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "each of the crosslinked ion exchange resins is crosslinked with a polyfunctional vinyl compound or a polyfunctional methacrylic acid derivative", which is unclear. Specifically, the polyfunctional compounds are the monomer used to produce the crosslinked ion exchange resin, the polyfunctional compounds are not crosslinking agents or crosslinking initiators. Examiner suggests "each of the crosslinked ion exchange resins is produced from at least one crosslinkable monomer selected from the group consisting of a polyfunctional vinyl monomer and a polyfunctional methacrylic acid derivative monomer".

Furthermore, “the inorganic particle is a lamellar particle” should recite “the inorganic filler is a lamellar particle” to provide proper antecedent basis.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5-14 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fenton et al., US 6,465,136.

Fenton teaches a composite membrane structure comprising a composite membrane and at least one protective layer disposed adjacent to the composite membrane. The composite membrane is a porous polymeric matrix (porous film) and an ionically conductive solid, noble metal or combination thereof dispersed within the matrix, and preferably, a binder. The binder is an ion exchange polymer. The protective layer comprises binder and ionically conductive solid, hygroscopic fine powder or a combination thereof (abstract). The porous polymeric matrix possesses high porosity and extremely fine pore size. Preferably the matrix has pores possessing a maximum dimension in the range from about 0.025  $\mu\text{m}$  to about 1  $\mu\text{m}$ . (4:66-5:13). The ionically conductive solid and binder are impregnated into the porous polymeric matrix in order to render the interior volume of the membrane occlusive (33-39). The binder is preferably present in the composite membrane and is any chemically and electrochemically stable ion exchange resin or other polymer with high ionic conductivity (6:19-29). The protective layer comprises a binder and hygroscopic fine powder. The fine powders may be silica or titania and

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have an average particle size less than about 10  $\mu\text{m}$  (6:61-67). The binder employed in the protective layer may be the same as that employed in the composite membrane (6:40-60). The matrix has porosity in the range of 40-95%, more preferably 60-90% (5:14-20). The matrix has a thickness of 6-102  $\mu\text{m}$  (4:55-65). The binder and ionically conductive solid employed in the protective layer are the same types of materials as those dispersed within the composite membrane (continuous phase) (6:50-54). Noble metals (inorganic filler) can be used in addition to the ionically conductive solid in the composite membrane (6:7-18). Crosslinkable ion exchange materials are described at column 6, lines 25-29 that include polystyrene sulfonic acid. Note polystyrene is an aromatic polymer made from the aromatic monomer styrene (styrene is also known as vinyl benzene). Therefore, polystyrene sulfonic acid is a polyfunctional vinyl compound with the vinyl group being one functional group and the sulfonic acid group being a second functional group.

Fenton does not explicitly teach the inorganic filler is a lamellar in shape with the claimed aspect ratio.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the courts have held that where the only difference between the prior art and the claimed invention was a recitation of relative dimensions (size or shape) of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. See MPEP 2144.04.

Regarding claims 10 and 11, one of skill would have known that the composite membrane with protective layer of Fenton and the ion exchange membrane of the claimed invention would have had similar properties.

\*

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fenton et al., US 6,465,136 in view of Roark et al., US 7,001,446.

See discussion of Fenton above regarding claim 1. Fenton does not explicitly teach the fine particles are selected from the materials of pending claim 15.

However, Roark teaches a protective layer is applied to a membrane to protect the catalyst from the detrimental effects of feedstream and other contaminants that may enter the membrane. Exemplary protective layers include alumina, zirconia and other metal oxides. A protective layer of porous perovskites can be used to protect the membrane from poisoning. In addition, a protective layer comprising a ceramic or other material that absorbs water or hydrocarbons can be provided (9:57-10:16).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the perovskite protective layer material of Roark for the protective layer of Fenton because Fenton teaches useful powders for the protective layer are those which are capable of absorbing water. The protective layer of Fenton decreased the amount of fuel crossover and the protective layer of Roark prevents the feedstream and contaminants from passing through to the membrane. Therefore, one of skill would have been motivated to use the protective layer materials of Roark for the protective layer of Fenton to decrease fuel (feedstream) crossover.

### ***Response to Arguments***

Applicant's arguments filed 2/5/08 have been fully considered but they are not persuasive.

Applicant argues Fenton fails to teach or suggest an ion exchange membrane produced from a crosslinkable monomer such as a polyfunctional vinyl compound. However, Fenton teaches crosslinkable ion exchange materials at column 6, lines 25-29 that include polystyrene sulfonic acid. Note polystyrene is an aromatic polymer made from the aromatic monomer styrene (styrene is also known as vinyl benzene). Therefore, polystyrene sulfonic acid is a polyfunctional vinyl compound with the vinyl group being one functional group and the sulfonic acid group being a second functional group.

Applicant asserts Nafion cannot be used in a direct methanol fuel cell (DMFC) because it cannot permeate non-ionic methanol. This assertion is not supported. Examiner points to Kindler (US5992008) that discloses Nafion is a preferred membrane material for a DMFC (Fig 1 & 3:32-38). Note at least pending claim 1 does not recite a DMFC.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April 22, 2008

/Tracy Dove/

Primary Examiner, Art Unit 1795